



NEW HOUSE  
230 APOLLO BAY ROAD  
APOLLO BAY, BRUNY ISLAND

SITE AND SOIL EVALUATION REPORT  
AND  
SYSTEM DESIGN FOR  
ON-SITE WASTEWATER MANAGEMENT

SEPTEMBER 2025



## Cover

View northwest from the lower boundary of 230 Apollo Bay Road over Apollo Bay.

Photo: Bill Cromer, 8 August 2025.

## Refer to this report as

Cromer, W. C. (2025). *Site and Soil Evaluation Report, and System Design for On-site Wastewater Management, new house at 230 Apollo Bay Road, Bruny Island*. Unpublished report for S. Owen by William C. Cromer Pty. Ltd., 10 September 2025.

It replaces a report of the same title dated 21 August 2025.

## Important Notes

### Report Distribution

This report has been prepared by William C Cromer Pty Ltd (WCCPL) for use by stakeholders (including regulators, developers, designers and architects, surveyors, engineers, contractors, builders, building surveyors and owner-occupiers) involved with the residential development of the property named above. It is to be used only for the purpose of installing and maintaining an on-site domestic wastewater management system on the property.

This report includes certification via a Form 35 certificate for WCCPL to validate its contents.

[It is a condition of certification that all relevant stakeholders are provided with a copy of this report.](#)

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### Footings and foundations

In this report, foundations are (usually) natural materials into which man-made footings are placed to support man-made structures.

### Limitations of this geotechnical report

Site investigations for geotechnical reports usually but not always involve digging test holes and taking samples, at locations thought appropriate based on site conditions and general experience. The reports only apply to the tested part(s) of the site, and if not specifically stated otherwise, results should not be extrapolated to untested areas.

The main aim of the investigations is to reasonably determine the nature of and variability in subsurface conditions at the time of inspection. The number and location of test sites, and the number and types of tests done and samples collected, will vary from site to site. Subsurface conditions may change laterally and vertically between test sites, so discrepancies may occur between what is described in the reports, and what is exposed by subsequent excavations. No responsibility is therefore accepted for (a) any differences between what is reported, and actual site and soil conditions for parts of an investigation site not assessed at the time of inspection, and (b) subsequent activities on site by others, and/or climate variability (eg rainfall), which may alter subsurface conditions at the sites from those assessed at the time of inspection.

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## Important

It is the responsibility of the client or the client's plumber to contact the designer at least one week before installation of the wastewater system so that designer inspection (if required), and certification of it can be arranged.

## Warning

Printed copies of this report must be in colour, and in full.  
No responsibility is otherwise taken for its contents.





## SUMMARY

The existing two-bedroom house at 230 Apollo Bay Road has a waterless composting toilet system and separate greywater disposal in a 20m long absorption trench.

A new four-bedroom house is proposed, next to the existing one which will become an auxiliary dwelling.

It is intended that in future, all wastewater from the auxiliary dwelling will be connected to the on-site wastewater management system (OWMS) for the new house.

The combined daily wastewater volume is assumed to be 1,000L (6 bedrooms = 8 people; 8 x 120L/day/person = 960L; rounded to 1,000L).

A land application area (LAA) has been selected adjacent to the new house. Six excavator test pits dug on 7 August 2025 show the soils are Category 5 moderately- to well-structured silty clay over clayey silt (extremely weathered dolerite bedrock).

The proposed OWMS comprises an AWTS, and pumped discharge of secondary-treated effluent to a nonconventional (raised) bed (NCB) of imported Category 1 sand. The adopted Design Loading Rate is 13mm/day/m<sup>2</sup>, requiring a minimum wetted area of 75m<sup>2</sup>. This is accommodated with a 15m long x 5m wide distribution module, inside a footprint of 160m<sup>2</sup> of imported sand (allowing for perimeter strips around the module).

Pipework for a future connection from the auxiliary dwelling to the AWTS should be done when the NCB is installed.

The design complies with AS/NZS1547:2012 *Onsite Domestic Wastewater Management*, and Table E23.1 and Section E23.10.1 of the Tasmanian *On-site Wastewater Management Code* (Code E23.0 in the Kingborough Council Interim Planning Scheme 2015). For Section E23.10.1, the design accords with Acceptable Solutions for separation requirements A1 and A3 – A7, and Performance Criterion P2.





# 1 BACKGROUND

## 1.1 Purpose of this report

The existing one or two bedroom house at 230 Apollo Bay Road, has an outside waterless composting toilet system (WCT) and a separate 20m x 1m wide absorption trench for greywater.

The owners proposed to retain the existing house as an auxiliary dwelling, and build a new four-bedroom house adjacent to it.

This report includes a Site and Soil Assessment, and design for an On-site Wastewater Management System (OWMS), for the new house. The new OWMS is sized for six bedrooms to include the wastewater from the existing house, where at some future unspecified time, the WCT and greywater trench will be abandoned.

This report is intended to support an application to Kingborough Council for a Plumbing Permit for the OWMS.

## 1.2 Personnel and date of investigations

Site and soil investigations were conducted by Bill Cromer of William C Cromer Pty Ltd (WCC) on 7 August 2025. Mr. John Lampkin provided and operated the 3.5t excavator. Owner Ms. Owen was present at the time; options for wastewater design were discussed on-site, and her assistance with the survey work is gratefully acknowledged.

Six excavator test pit were dug and photographed in the area proposed for a wastewater Land Application Area (LAA). The pits were surveyed relative to the floor level of the existing and proposed houses: the intent is that the final LAA surface is at or close to the same level as the proposed gravelled area at the NNW end of the new house, so that the amenity of the area is enhanced.

## 1.3 Previous reports

I have reviewed the following reports concerning the proposed new house on the property:

- Cumming, J. P. (2020). *AS2870 Site Assessment, 230 Apollo Bay Road, Apollo Bay*. Unpublished report by Geo-Environmental Solutions for Ms. Sarah Owen, 20 February 2020.
- Cumming, J. P. (2020). *Onsite Wastewater Assessment, 230 Apollo Bay Road, Apollo Bay*. Unpublished report by Geo-Environmental Solutions for Ms. Sarah Owen, July 2020. This report only considered the existing house.
- Gray, D. (2024). *Town Planning advice – proposed Dwelling in the Environmental Living zone: Stage 1a Preliminary planning review of draft plans. 230 Apollo Bay Road, Apollo Bay (Bruny Island)*. Unpublished report by Gray Planning for Ms. S. Owen, 10 December 2024.





## 2 SITE AND SOIL EVALUATION

### 2.1 Location, topography, drainage and zoning

The 0.44ha property faces northwest, with a 66m frontage on gravelled Apollo Bay Road, and longer boundaries of 90m and 100m leading down towards Apollo Bay. The lot is separated from high water mark by a 30 – 40m wide strip of land owned by Kingborough Council (Maps 1.1 and 1.2 in Attachment 1).

Average slope angles are in the 8 – 10° range, but are in the 5 – 6° range across the proposed LAA, steepening locally to 12 – 14° immediately adjacent to it.

An intermittent creek runs down and inside the property along its northeastern boundary (Pages 2.1 and 2.2 in Attachment 2).

The property is zoned *Environmental Living* in the Kingborough Interim Planning Scheme 2015 ([www.thelist.tas.gov.au](http://www.thelist.tas.gov.au)).

### 2.2 Water and electricity supply

Rain water tanks. Electrical supply is available.

### 2.3 Assumed daily wastewater

Existing house = 2 bedrooms-equivalent; New house = 4 bedrooms  
Total = 6 bedrooms  
Equivalent number of people = 8

Rainwater tanks = 120L/day/person for all wastewater. Total daily wastewater volume = 960L (say, 1,000L).

### 2.4 Site geology

#### 2.4.1 Published geology of the property

The geological map<sup>1</sup> of the area (Map 1.3 in Attachment 1) shows the property is underlain by Jurassic-age dolerite.

#### 2.4.2 My interpretation of the geology

There are no exposures of bedrock over the property, except in a 1m high curtiling at the rear of the existing house. Here, a uniform clayey soil profile about 0.7 – 0.8m thick overlies extremely weathered dolerite bedrock (Plate 3.10 in Attachment 3).

Test pit B also exposed material interpreted as extremely weathered dolerite bedrock below a depth of 0.7m (Table 1).

<sup>1</sup> Farmer, N. (1981) .Geological Atlas 1:50,000 Scale Series. Sheet 8311N. Kingborough. Dept. Mines Tasmania





Table 1. Summary of test pits. See Page 2.2 in Attachment 2 for pit locations.

Client OWEN				Test pit		A	B	C	D	E	F
Location 230 Apollo Bay Road Apollo Bay, Bruny Island				Depth dug (m)		0.7	0.8	0.85	0.7	0.7	0.9
Date dug 07-August-2025				Easting (GDA94)		524058	524050	524046	524059	524051	524061
				Northing (GDA94)		5221547	5221545	5221551	5221554	5221555	5221557
				Water inflow (depths in m)		None	None	Trace	None	None	None
				Standing water level (m)		N/A	N/A	N/A	N/A	N/A	N/A

No.	Layer	Details	USCS	Interpretation		Figures are depths to top and bottom of layer, in metres					
				Horizon	AS/NZS 1547 soil category	A	B	C	D	E	F
1	Silty CLAY	Brown; Moderate to High Plasticity; variable moisture, mainly <= PL (> PL Pit C); cloddy; moderately-well-structured	CH	Uniform soil profile	5	0 to 0.7; D@0.4 EAR	0 to 0.7; D@0.4 EAR	0 to 0.85; D@0.4 EAR	0 to 0.7; D@0.4 EAR	0 to 0.7; D@0.4 EAR	0 to 0.9; D@0.4 EAR
2	Clayey sandy SILT	Light yellowish brown; Low Plasticity; Dry	CL	Extremely weathered dolerite bedrock	5		0.7 to 0.8 EAR				

**Notes and abbreviations**

- USCS = Unified Soil Classification System
- Grey cells indicate a missing layer or layers in a test pit
- Easting and Northing coordinates from Google Earth and hand-held GPS. Datum is GDA94.
- Excavability** Equipment = 3.5t Kubota excavator; 0.45m GP bucket; 4 teeth; Operator: John Lampkin  
EAR = end as required; NR = no refusal; CR = close to refusal; R = refusal.
- Samples** D = disturbed sample; U50 = Undisturbed 50mm diameter drive tube sample
- Weathering** For rock only. F = fresh; SW = slightly weathered; MW = moderately weathered; HW = highly weathered; EW = extremely weathered (ie soil properties; material can be remolded in the hand, with or without water)
- Moisture** D = dry; M = moist (M<=>PL = moisture less than, equal to or greater than Plastic Limit); W = wet.
- Consistency** Fb = Friable (crumbles to powder when scraped with thumbnail)  
S = Soft (Easily penetrated by fist; 25 – 50kPa)  
F = Firm (Easily penetrated by thumb; 50 – 100kPa)  
St = Stiff (Indented with thumb; penetrated with difficulty; 100 – 200kPa)  
VSt = Very stiff (Easily indented with thumbnail; 200 – 400kPa)  
H = Hard (Indented by thumbnail with difficulty; >400kPa)
- Rel density** VL = Very loose (ravelling)  
L = Loose (easy shovelling)  
MD = Medium dense (hard shovelling)  
D = Dense (picking)  
VD = Very dense (hard picking)

## 2.5 Soils

### Texture and thickness

Soil across the proposed LAA is a uniformly-textured, moderate- to high-plasticity, moderate – to well-structured brown silty CLAY (CH; Layer 1 in Table 1). The clay is the dominant material in the the top 1 – 1.5m of the profile. It displays variable mositure content, usually less than the Plasticity Limit. Moisture level was higher in Pit C, and a trace of water entered the base of the pit (adjacent to, and probably originating from, the start of the exisitng greywater trench).

### 2.5.2 AS/NZS1547 soil category

The soil (and the overall profile for designing the OWMS) has a visually-estimated soil category of 5, based on texture, consistency and structure.





### 2.5.3 Soil dispersion

The clayey profile is mostly highly- to moderately-dispersive, based on testing a single sample from a depth of 0.4m in each of the test pits (Figure 1). The dispersivity will be managed in system design by adding gypsum to the base of the facility (Attachment 4), although the issue is not significant because the wastewater will be applied in a diffuse manner over the LAA.

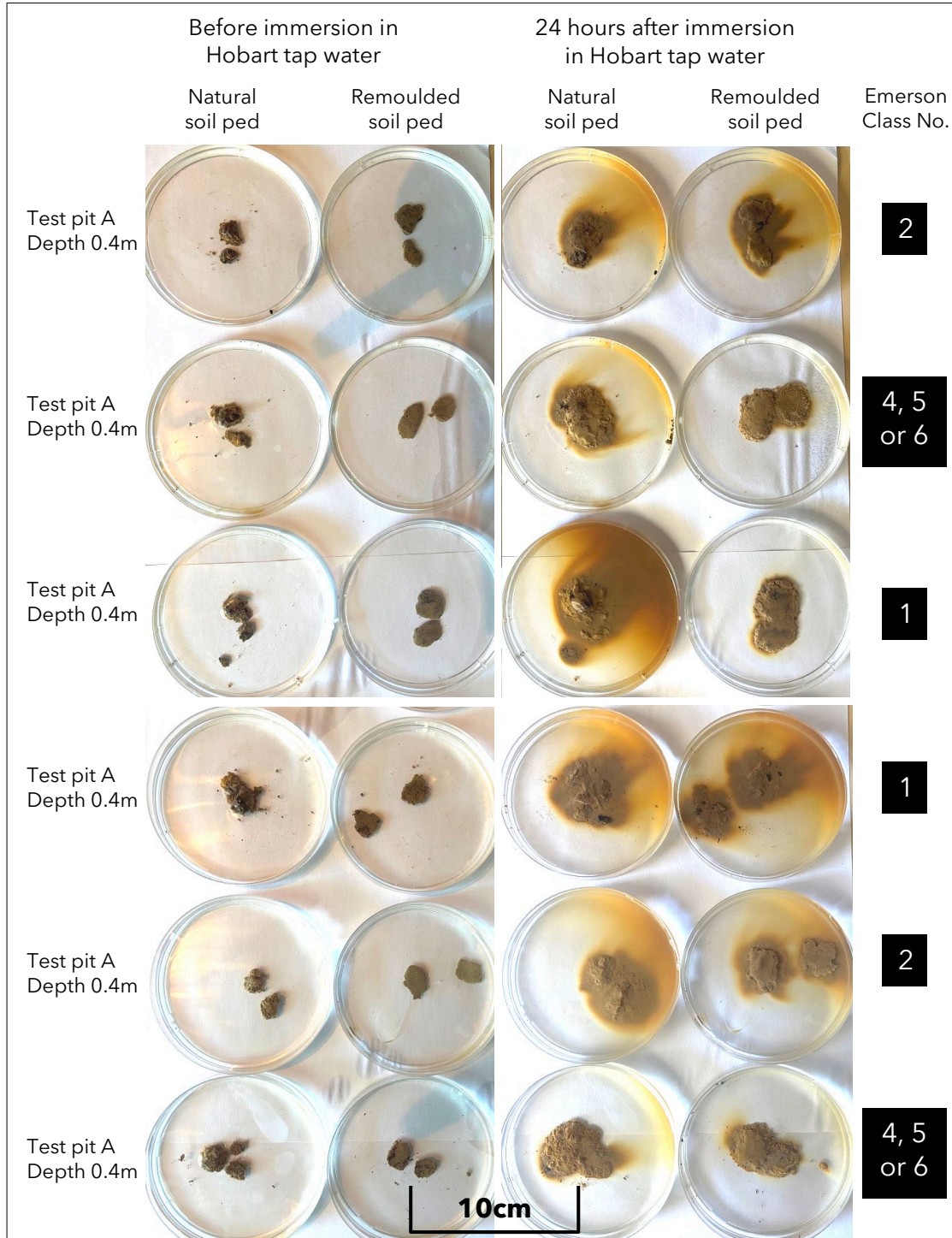


Figure 1. Results of dispersion testing of soil samples from test pits A - F. Emerson Class Numbers of 1 or 2 are highly or moderately dispersive; samples with numbers 4, 5 or 6 are slightly dispersive.





## 2.6 Fill

The proposed LAA locally has up to 0.2m of topsoil and mulch fill over parts of it.

## 2.7 Soil selected for wastewater disposal

Imported Category 1 sand, overlying existing Category 5 soil averaging 0.7m thick.

A sufficient thickness of imported sand will change the existing Category 5 profile to Category 1. See Attachment 4.

## 2.8 Current wastewater system

The existing house has a separate WCT and, for the dwelling, reportedly a 20m long x 1.2m wide greywater absorption trench (Pages 2.1 and 2.2 in Attachment 2, and Plates 3.5, 3.6 and 3.8 in Attachment 3).

It is proposed that the OWMS for the new house will be sized to also accept all wastewater from the existing house (which will become an auxiliary dwelling).

## 2.9 Proposed on-site wastewater management system (OWMS)

### 2.9.1 Proposed wastewater treatment method

The OWMS for the new house will comprise:

- an aerated wastewater treatment system (AWTS),
- pumped discharge to perforated, colour-coded HDPE (poly) pipes in a nonconventional bed (NCB); the NCB will consist of imported Category 1 sand and its upper finished surface will be level and contiguous with the semicircular gravelled area proposed at the NNW end of the new house.

See Attachment 4 for the location and design of the LAA.

### 2.9.2 Design Loading Rate (DLR)

Conservatively adopted as 13mm/day (ie 13/m<sup>2</sup>/day) in accordance with Table L1 of AS/NZS1547:2012.

### 2.9.3 Minimum wetted area required for wastewater disposal

The wetted area required is the daily wastewater volume divided by the DLR. This is 1,000L/day divided by 13L/m<sup>2</sup>/day = 75m<sup>2</sup>, in accordance with Section L4 of AS/NZS1547:2012.





## 2.10 Groundwater

At the time of investigation, shallow seepage water was encountered at the base of test pit C. This is interpreted as greywater seepage from the end of the adjacent trench. The other five pits did not encounter water, although, as would be common throughout the district following heavy or prolonged rain, perched water table conditions might temporarily exist in the soil.

Permanent groundwater conditions are expected to exist in bedrock beneath the property and throughout the area, but at depths which will not affect wastewater management.

The DPIPWE water bore [database](#) shows no water bores within 2km of the LAA..

## 2.11 Slope stability

### 2.11.1 Published evidence of instability

#### 2.11.1.1. Landslide hazard bands

Parts of the Apollo Bay foreshore and nearby low hills are in the Low landslide Hazard band, but 230 Apollo Bay Road is not.

#### 2.11.1.2 Landslide inventory

The Mineral Resources Tasmania landslide database records no landslides on North Bruny apart from two at Dennes Point.

### 2.11.2 Evidence of instability on the property

The weathered bedrock expected at depths below about one metre in the six test pits at the LAA is regarded as stable.

There is no evidence of slope instability on the property, and none is expected given the relatively shallow depth to bedrock, and the overall moderate slope angle of the site. The landslide risk is regarded as acceptably Low.

### 2.11.3 Landslide risk management

No landslide risk management is required for residential development, including the OWMS.





## 3 SYSTEM DESIGN AND REGULATORY COMPLIANCE

### 3.1 Regulatory requirements for wastewater management

Wastewater management on this property must comply with AS/NZS1547:2012 *Onsite Domestic Wastewater Management*, and the Tasmanian *On-site Wastewater Management Code* (Code E23.0 in the Kingborough Council Interim Planning Scheme 2015; the “Code”).

In the *Code*, a wastewater design and location on the property must comply with Section E23.7 *Development Standards for Residential Development*, and E23.10 *Development Standards for Land Application Areas*.

### 3.2 Section E23.7 Development Standards for Residential Development

The objective of Section E23.7 of the *Code* is to “*to ensure sustainable onsite wastewater management for residential development.*”

Acceptable Solution A1 of Section E23.7.1 refers to its Table E23.1 and requires that an area of 50m<sup>2</sup> per bedroom be set aside for disposal of secondary treated wastewater to Category 1 soils (in this instance, within the LAA), and 100m<sup>2</sup> per bedroom outside the LAA. This area is available.

### 3.3 Section E23.10 Development Standards for Land Application Areas

The objective of Section E23.10 of the *Code* is to “*to provide for sustainable onsite wastewater management through the provision of appropriate land application areas.*”

Section E23.10 of the *Code* sets out Acceptable Solutions (A) and Performance Criteria (P) for horizontal and vertical separation distances for disposal systems in LAAs. These are summarised in Table 2 for the OWMS. The location of the LAA constitutes Acceptable Solutions for separation requirements A1 and A3 – A6, and Performance Criterion P2, in Section E23.10.1.





Table 2. System compliance of the LAA with Section E23.10.1 of the Code

Separation distances to a disposal area:	Compliance of this site	Reasons for compliance	References, or relevant section of this report
Horizontal distance from a building	Complies with A1(a)	LAA no less than 6m from building	Attachment 4
Horizontal distance from downslope surface water	Complies with P2(f)(i and ii)	Secondary treatment; >15 to nearest surface water; raised bed	Attachment 4
Horizontal distance from a property boundary (measured at right angles to contours)	Complies with A3(b)(iii)	c.30m to boundary on 12 degree slopes	Attachment 2 and 4
Horizontal distance from a downslope bore, well or similar water supply	Complies with A4	No recorded operating water bore within 2km or so of site	See the Groundwater Information Access Portal ( <a href="http://dppw.tas.gov.au/water/groundwater/groundwater-information-access-portal">http://dppw.tas.gov.au/water/groundwater/groundwater-information-access-portal</a> )
Vertical distance from groundwater	Complies with A5	Nonconventional (raised) bed; no water table expected in surface 1.5m	General hydrogeological principles
Vertical distance from a limiting layer	Complies with A6	Nonconventional (raised) bed; No limiting layer beneath distribution pipework in surface 1.5m.	Part A of report, Attachment 2 and 4
LAA arrangement	Complies with A7	LAA not beneath buildings; dimensions larger than 3m	Part A of report, Attachment 2 and 4

### 3.4 Summary of system design

An acceptable (and recommended) disposal option for wastewater management for the property is summarised below, with layout and design details in Attachment 4.

**Method** Secondary treatment in an AWTS, and pumped discharge to a nonconventional bed

**Components**

AWTS

Colour coded HDPE (poly) delivery pipework AWTS to LAA

LAA including distribution module and colour coded pipework

**In-ground details for LAA**

Wetted area Min. 75m<sup>2</sup> assuming a wastewater volume of 1,000L/day

Back-up Area Available

Design See Attachment 4.

Cut-off drain(s)/berm Required. See Attachment 4

Setback(s) See Table 1.





## 4 GENERAL NOTES

### 4.1 Applying for a Plumbing Permit (PP)

This document is intended to support, not replace, an application to local Council for a Plumbing Permit.

This report sizes one or more Land Application Areas (LAAs) within which wastewater must be disposed, but the proposed location of the LAA may be nominal. There may be flexibility in its location provided setback distances are satisfied, and the final location would be specified when applying for a Plumbing Permit.

Detailed design notes for some wastewater systems, and related wastewater information, are [available on my website](#).

### 4.2 Appointment of designer and inspection arrangements

If required, William C Cromer Pty Ltd accepts the role of Designer for the design(s) suggested in this report. A **Form 35** is included with this document.

Depending on local government policy, the designer may be required to make as many site inspections as is necessary to be able to certify to the client and the local Council that:

- the installed system appears to conform with the approved design, and
- the system, as installed, appears to conform with the currently-adopted version of AS/NZS1547.

Usually, certification is required before the dwelling can be occupied and the wastewater disposal system used.

It is the responsibility of the client or the client's agent to contact the designer before construction starts on the wastewater disposal system, in order to establish the stages of construction (if any) required to be inspected by the designer.

### 4.3 System, design, performance and maintenance

Depending on the type of wastewater disposal system installed, owners may be required by Council to satisfy all or some of the following, which would usually form a set of conditions of approval for a plumbing permit.

1. The system shall comply with the currently-adopted version of AS/NZS1547.
2. All tank and system openings shall be accessible at finished surface level for inspection and servicing, and adequately sealed to prevent stormwater infiltration.
3. Where pumps are fitted, and power is required for system operation, a hard-wired audible and visible (indicator light) alarm shall be installed to warn of pump failure, blower failure and power failure.





4. Where an existing disposal system is being added to or altered and the existing septic tank is going to be used, a filter will need to be retro-fitted to the existing septic tank. Owners will need to advise their plumber to ensure that this matter is taken into consideration when purchasing a new septic tank or where the filter is to be retro-fitted.
5. The minimum wetted area requirement for wastewater disposal must be installed and maintained in the approved locations as per the design by the Designer and lodged with the application for a Plumbing Permit.
6. All wastewater disposal (including irrigation) areas shall be completed, approved and formally signed off by the Designer as appearing to comply with AS/NZS1547 prior to commissioning of the system. Certification, in a format approved by Council; shall include a site plan to scale showing the wastewater disposal locations and areas property boundaries, infrastructure, GPS grid coordinates.
7. All pipes, pipe sleeves, identification tapes, and outlets on an irrigation system shall be appropriately colour-coded..
8. If one or more wastewater irrigation systems are proposed, they shall be constructed and installed in accordance with approved plans accompanying the Plumbing Permit, and the following:

Spray Irrigation Systems:

- The sprinklers used for distributing the wastewater must of a type that minimise formation of small droplets and aerosols. Impact and pencil type sprays shall not be used.
- A flush valve is to be installed on each irrigation area so that the lines can be flushed. The discharge from the flush valve must discharge either onto the irrigation area or piped back to a suitable chamber of the treatment system, having regard to whether the wastewater is chlorinated or not, so that the efficacy of the treatment plant is not compromised by the introduction of the flush water.
- Flush valves are to be installed in valve boxes to enable inspection and service.

Drip and sub-surface Irrigation Systems:

- Only pressure compensated drip line shall be used.
- Vacuum breaker valves are to be provided at the high point(s) of all irrigation fields. Such valves are to be installed in valve boxes to enable inspection and service.
- A flush valve is to be installed on the low point of each irrigation field with piping discharging the flush water to a suitable chamber of the treatment system, having regard to whether the wastewater is chlorinated or not, so that the efficacy of the treatment plant is not compromised by the introduction of the flush water. Flush valves are to be installed in valve boxes to enable inspection and service.





9. Unless specifically advised by the Designer as unnecessary or inappropriate, an effective surface water diversion drain or mound shall be provided and maintained on the high side of wastewater disposal (including irrigation) areas. Note that all concentrated stormwater must be retained on the property.

10. Weed matting, plastic or other materials that impede water penetration into the soil shall not be used between the irrigation system and the soil surface.

11. All wastewater irrigation areas shall be maintained in good order at all times. Such maintenance includes but may not be restricted to weeding, mowing, and replacement of mulch or plants.

12. Council shall be provided with an amended plan if the location of the irrigation area is altered or changed from the "as installed" plan. The owner shall ensure that any altered wastewater disposal (including irrigation) areas meet minimum setback distances from boundaries and buildings and any other conditions contained within this permit.

13. The wastewater treatment system shall be regularly maintained in accordance with the conditions of accreditation issued under the Tasmanian Plumbing Code.

14. Any septic tank associated with the disposal system shall be desludged at least once every five years.

15. Where required, the owner shall enter into and maintain an on-going service maintenance agreement with a person with appropriate qualifications and experience to maintain the wastewater disposal system in accordance with the Plumbing Regulations 2004 and the Tasmanian Plumbing Code. A copy of the signed agreement shall be submitted to Council before commissioning of the system.

16. Where required, effluent quality for land application shall meet the criteria specified in the installed system's certificate of accreditation or, if not specified, as follows from AS/NZS1547:

5-day Biological Oxygen Demand (BOD5)	20mg/L
Suspended Solids (SS)	30mg/L
Thermotolerant coliforms	10 per 100mL
Free chlorine residual	0.5mg/L

17. Only when these tests indicate compliance will the unit be regarded as being commissioned. A NATA approved laboratory should conduct such tests. Testing shall be conducted as follows:

a) Commissioning phase: Mandatory testing after three months from the final installation inspection (to coincide with the normal on-going scheduled maintenance visits) but fortnightly in the event of failure to comply

b) On going operational phase: Mandatory testing for a free chlorine residue is required every three months. Remedial works should be undertaken when the minimum free chlorine residual is not met. Random surveillance for BOD5, SS and thermotolerant coliforms shall be done at no less than once each 4 years. An authorised person may require sampling for BOD5, SS and thermotolerant coliforms or to undertake other chemical analyses to help identify operational problems.





18. Where required, monitoring details for individual on-site waste water management systems are to be recorded on a standardised form and lodged with the Council each quarter.

19. A final inspection of all installations may be conducted by a Council Environmental Health Officer following receipt of the written certification from the system designer. Plumbers and owners should be made aware that a minimum number of working days' notice is required for such inspections and the building will need to be open for inspection as required.

**W. C. Cromer**  
Principal

**This report is and must remain accompanied by the following Attachments**

- Attachment 1. Published maps of the Apollo Bay area including 230 Apollo Bay Road (4 pages)
- Attachment 2. Site and landscaping plans of 230 Apollo Bay Road (7 pages)
- Attachment 3. Site and test pit photographs, 7 August 2025 (12 pages)
- Attachment 4. System design for wastewater management (6 pages)
- Attachment 5. Loading Certificate (2 pages)
- Attachment 6. Risk assessment (2 pages)
- Attachment 7. Form 35 for this project (3 pages)
- Attachment 8. Documents required when applying for a plumbing permit for an on-site wastewater management system (2 pages)





## Attachment 1

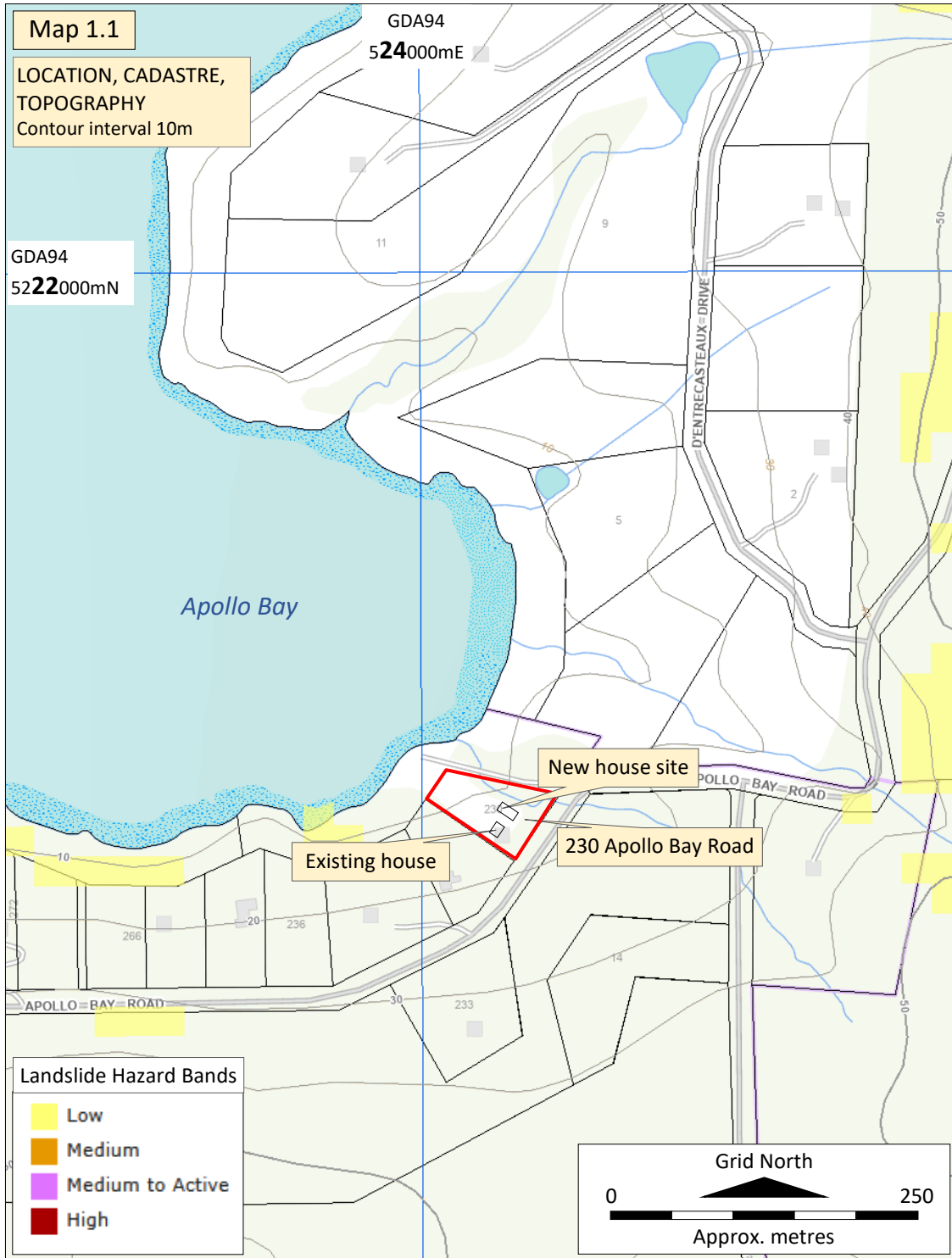
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### Published maps of the Apollo Bay area including 230 Apollo Bay Road

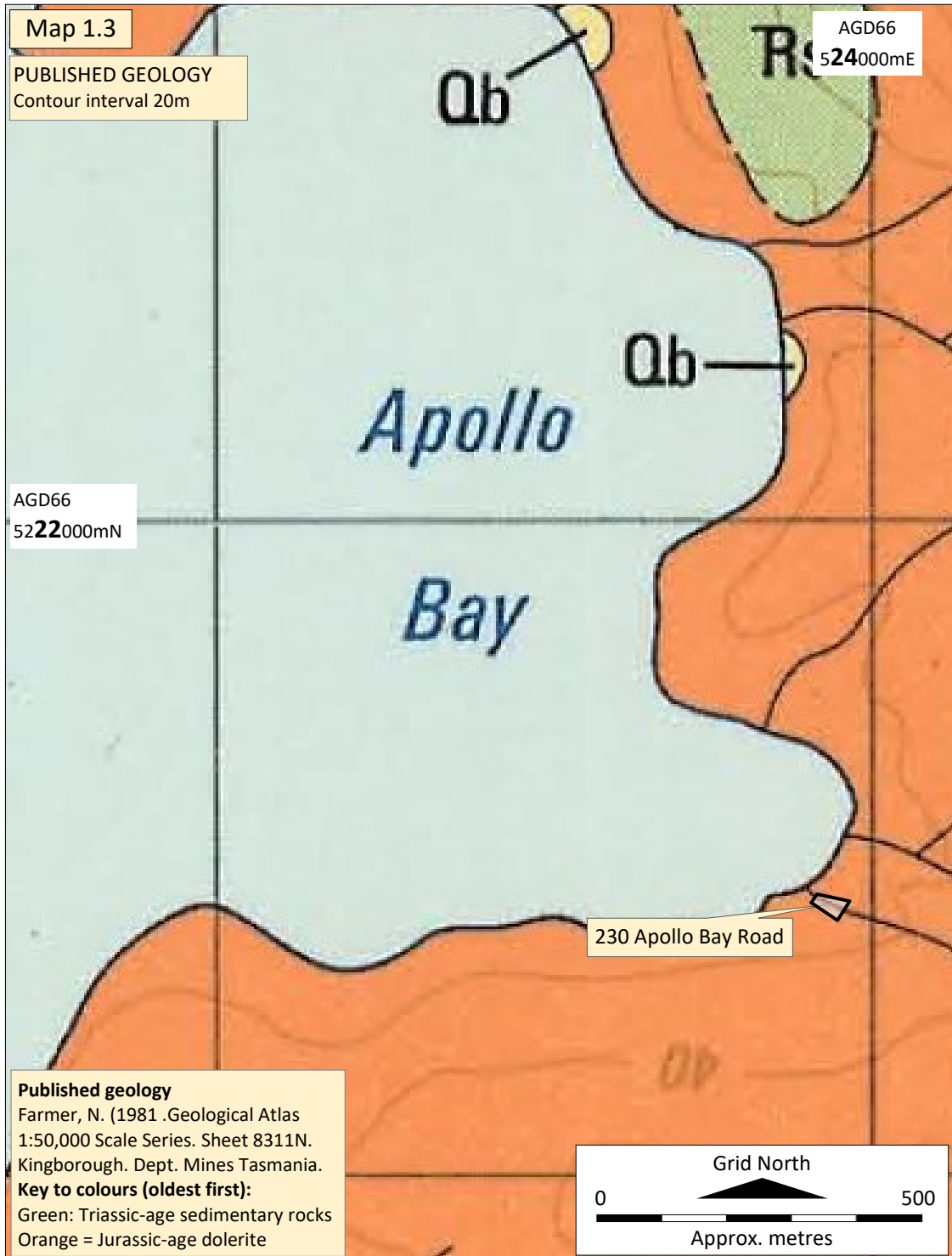
- Map 1.1 Location, cadastre and topography, landslide hazard bands
- Map 1.2 Aerial imagery, cadastre, topography
- Map 1.3 Published geology

Source: [www.thelsit.tas.gov.au](http://www.thelsit.tas.gov.au)











## Attachment 2

(7 pages including this page)

### Site and landscaping plans of 230 Apollo Bay Road

- Page 2.1 Aerial image showing proposed new house  
Source: [www.thelist.tas.gov.au](http://www.thelist.tas.gov.au)
- Page 2.2 Proposed new house, existing trench,  
test pits 7 Aug 2025, levels; Section line A – B
- Page 2.3 Site layout with proposed new house  
Source: Karen Abernethy Interiors/Architecture 28 Oct 2024
- Page 2.4 Conceptual landscaping plan  
Source: loci landscapes, Hobart
- Page 2.5 Conceptual landscaping views  
Source: loci landscapes, Hobart
- Page 2.6 Conceptual landscaping views  
Source: loci landscapes, Hobart





Page 2.1 Aerial imagery of 230 Apollo Bay Road showing proposed new house





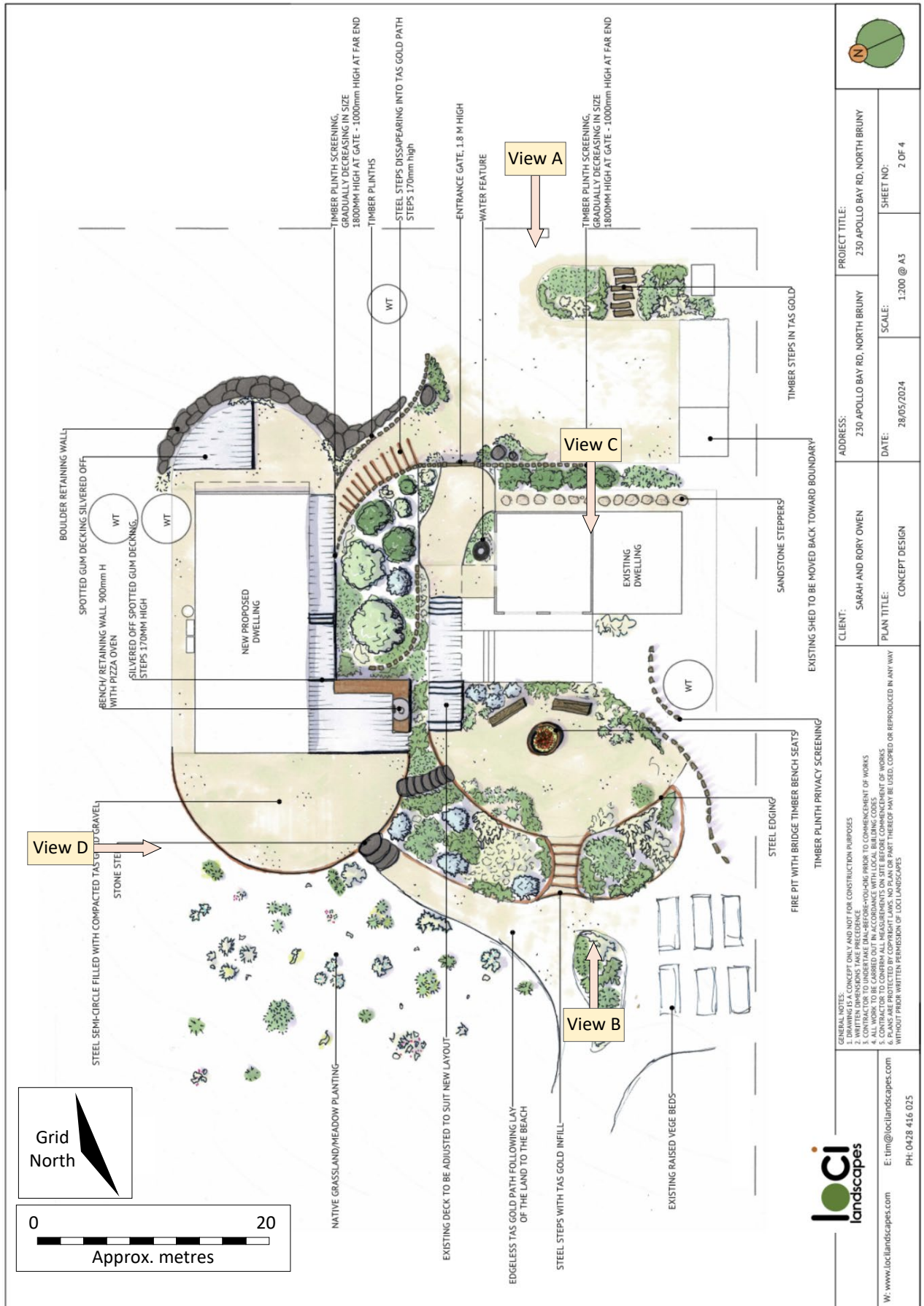
Page 2.2 Proposed new house, existing trench, test pits 7 Aug 2025, levels; Section line A – B







Page 2.4 Conceptual landscaping plan





Page 2.5 Conceptual landscaping views





Page 2.6 Conceptual landscaping views





## Attachment 3

(12 pages including this page)

### Site and test pit photographs, 7 August 2025

The scale in the photos is graduated into red- and black-numbered segments each one metre long. The numbers are decimetres.





Plate 3.1 (above). View west and cross-slope over the lower part of the property towards Apollo Bay.

Plate 3.2 (below). View southwest and gently upslope from the same vantage point as Plate 3.1.





Plate 3.3 (above). View south and gently upslope from the same vantage point as Plate 3.1.

Plate 3.4 (below). View southeast and gently upslope from the same vantage point as Plate 3.1.





Plate 3.5 (above). View east northeast and cross-slope towards the proposed new house; the proposed LAA occupies the mulch-covered ground.

Plate 3.6 (below). View northeast and cross-slope from the same vantage point as Plate 3.5.





Plate 3.7 (above). View north from the same vantage point as Plate 3.5.

Plate 3.8 (below). View northwest from the same vantage point as Plate 3.5.





Plate 3.9 (above). View west southwest from the same vantage point as Plate 3.5.

Plate 3.10 (below). Clayey soil profile overlying extremely weathered dolerite bedrock in a 1m high cut at the rear of the existing house.

















## Attachment 4

(6 pages including this page)

### System design for wastewater management [NCB; nonconventional (raised) bed]

Design variations for some components of the wastewater system are acceptable provided they produce the same or better results.

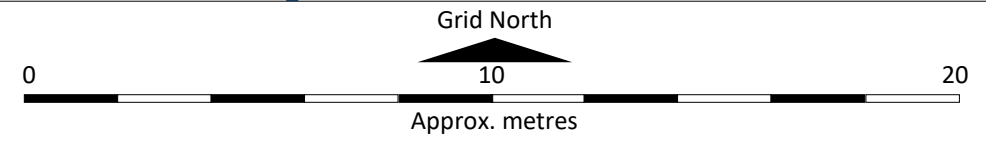
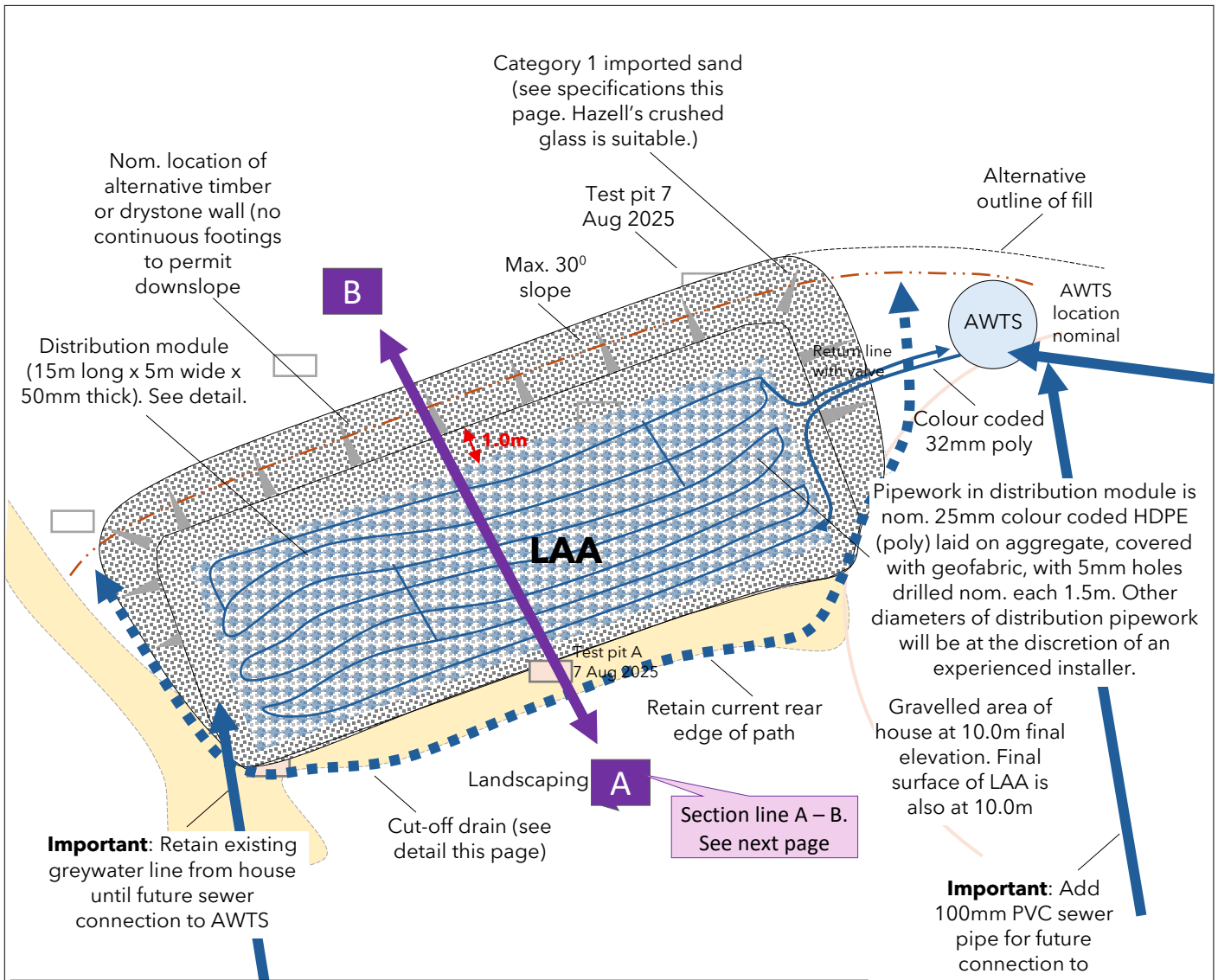
#### NOTES

1. The construction of this nonconventional bed involves earth moving and importing of off-site sand. Installers and house builders should assess access requirements, and whether the bed ought to be installed before construction of the new house.
2. The existing house will become an auxiliary dwelling, and the intention is that the existing outside WCT will later be replaced with an internal flush toilet, with all wastewater then connected to the AWTS for the new house. A 100mm PVC sewer line should be installed at the AWTS to cater for this future connection.
3. The final surface of the NCB shall be the same as the gravelled area at the NNW end of the new house (ie at 10.0m elevation). The owner shall determine the final finished surface (eg grass) over the NCB. No deep-rooted plants permitted. No access for heavy machinery, plant, etc.

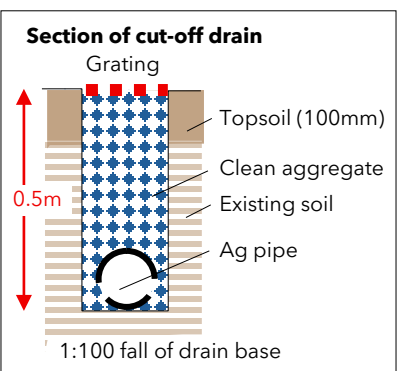




**General plan of OWMS**



Sieve analysis	
Typical Males coarse sand	
Sieve size (microns)	% retained by weight
500	60
425	8
300	8
250	7
180	8
106	7
90	1
63	0.4
45	0.4
<45	0.2
<b>Total</b>	<b>100</b>

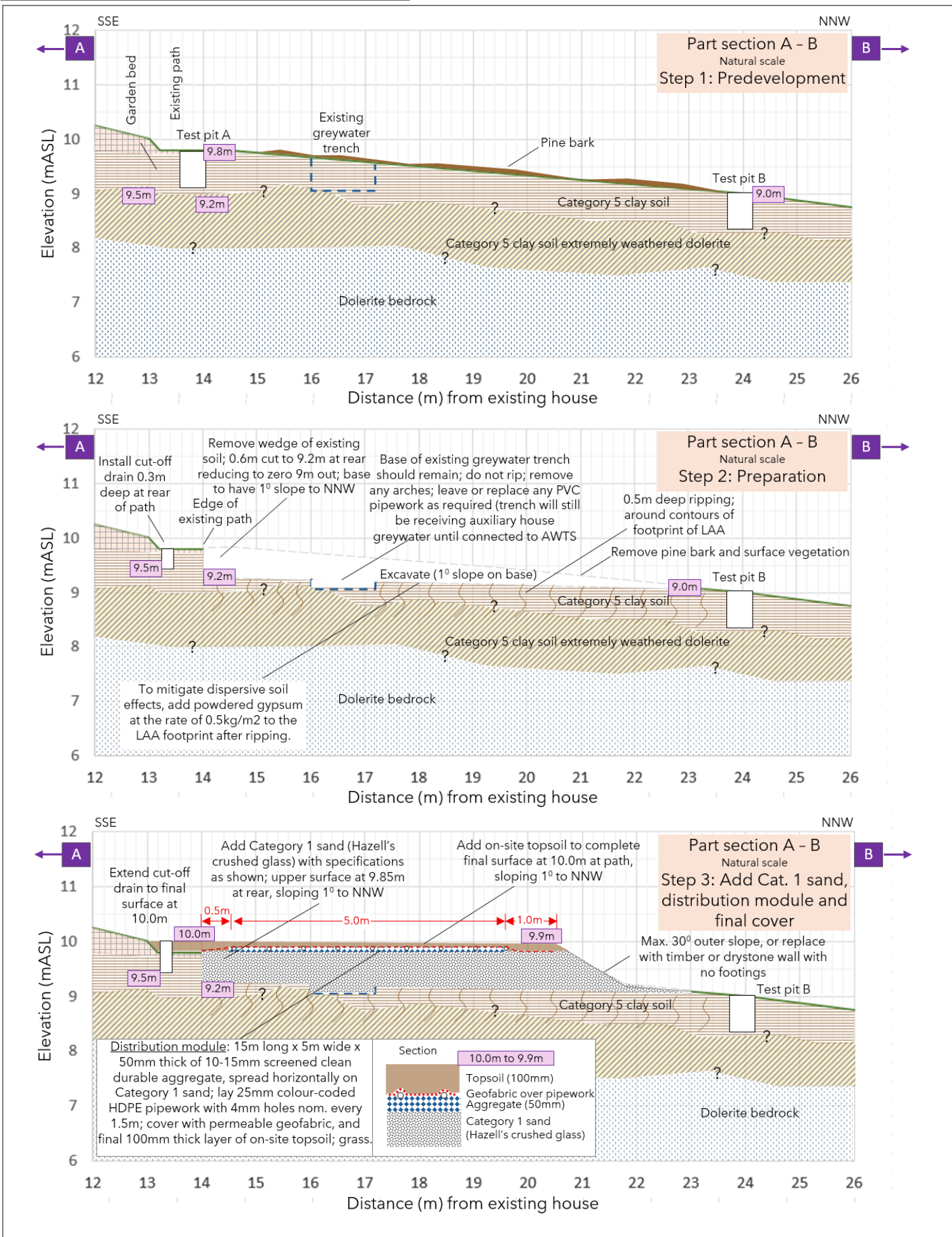


**IMPORTANT**  
Category 1 sand must be imported, clean, screened and washed COARSE SAND with grain size distribution similar to 'Males Coarse Sand' (see sieve analysis this page.)  
**Installer must collect and submit (for certification) to Bill Cromer (0408 122 127) a 2kg subsample from the sand proposed and set aside to be used.**





Cross sectional stages of development of NCB









## Shallow-Rooted Native Tasmanian Ground Cover Plants for Subsurface Wastewater Irrigation Areas (in addition to grassing the LAA)

Here are three native Tasmanian ground-cover species known for their very shallow growth habit, making them good choices to plant over shallow subsurface wastewater irrigation areas — reducing the risk of invasion of perforate distribution pipework. The list is of course not exhaustive.

### Native Tasmanian Ground-Covers with Shallow Roots

- *Mazus pumilio* (Swamp mazus): A prostrate, mat-forming perennial herb native to Tasmania and eastern Australia. It spreads widely but remains low and shallow—excellent as ground cover over irrigation systems.
- *Centella cordifolia* (Swamp pennywort): A trailing, mat-forming perennial found in wet areas of Tasmania. Its root network is shallow, stabilizing soil while staying sufficiently superficial.
- *Gunnera cordifolia* (Tasmanian mudleaf): A tiny ground-hugging plant (max height ~5 cm), forming dense mats in boggy or wet grasslands. Its diminutive size and shallow roots make it pipe-safe.

### Additional Notes & Best Practices

- Shallow root importance: For septic or irrigation areas, shallow-rooted species are important. Deep-rooters risk clogging or damaging pipes.

- Local adaptability: These species are native to Tasmania, making them well-suited to local climate, soil types, and moisture regimes.

- Selecting for moisture: Some options like Mazus, Centella, and Gunnera prefer wetter sites, which may align well with irrigation distribution zones.

### Plant Summary Table

Species	Growth Habit / Height	Root Depth / Behaviour
<i>Mazus pumilio</i>	Prostrate mat	Very shallow, fibrous network
<i>Centella cordifolia</i>	Trailing mat, low	Shallow, stabilizes damp soil
<i>Gunnera cordifolia</i>	Dense mat, ~5 cm high	Shallow, non-invasive

Native Tasmanian grasses vary quite a lot in rooting depth, and whether they are “shallow-rooted enough” for planting over a domestic shallow subsurface wastewater irrigation area depends on the species. Check with the supplier.





## Attachment 5

(2 pages)

### Loading Certificate Secondary wastewater treatment in an AWTS followed by discharge to a nonconventional (raised) bed

The owner should retain and read any certificate of accreditation, operating manual or related documents for the wastewater treatment system selected, to ensure optimal, nuisance free operation of the system with minimal environmental health impacts.

This loading certificate is provided in accordance with Clause 7.4.2(d) of AS/NZS 1547.2012.

#### System capacity (medium-long term)

8 people. Rainwater tanks. Wastewater generated = 1,000L/day.

#### Design criteria summary:

Effluent quality	Secondary from AWTS
Soil category	1 (Imported sand) and on-site topsoil
Land application area (LAA)	15m x 5m = 75m <sup>2</sup> (wetted, + apron, = c.160m <sup>2</sup> )

#### Reserve area.

Available

#### Water efficient fittings etc

Design assumes use of water efficient fixtures and fittings, eg 9L/min (max) showerheads, aerator fittings on taps and clothes washing machines/dishwashers with WELSS star ratings of 4.5 stars or above. (see <https://apps5a.ris.environment.gov.au/wels-public/search-product-select-load.do>)

#### Variation from design flow

Design wastewater flow is 1,000L/day from house and auxiliary dwelling. The system should successfully manage additional peak loadings which may result from occasional extra people provided that this does not exceed design capacity + 25% in a 24-hour period, no more than once quarterly.

#### Consequences of changing wastewater characteristics.

Avoid disposing of wastes which would be additional to those normally disposed of in a domestic sewerage system; in particular, increases in organic loadings such as from the use of sink-waste disposal units are to be avoided.

Use of household disinfectants or bactericides in anything more than small amounts and at recommended rates of dilution should also be avoided, as should the disposal of solvents and other chemicals or pharmaceuticals such as antibiotics or antimicrobials which may kill bacteria and other microorganisms required for effective wastewater treatment.

#### Consequences of overloading the system

Long term use by more than the specified number of people may result in biological and hydraulic overloading of the disposal system, surfacing of effluent, public and environmental health nuisances, pollution of surface waters etc.





### **Consequences of underloading the system**

The system will work effectively with as few as one person in residence; however long periods of zero-occupancy may result in poor functioning of the system when normal use recommences.

### **Consequences of lack of operation, maintenance and monitoring attention**

Maintain system in accordance with manufacturer's and installer's instructions.

Consequences of failure to observe the regular maintenance requirements may include any of the following:

- Spread of infectious diseases to family and neighbours.
- Nuisance and unpleasant odours.
- Pollution of waterways, streams, beaches and shellfish beds.
- Contamination of bores, wells and groundwater.
- Excessive and unsightly weed growth.
- Alteration of local ecology

### **Other relevant considerations**

- Livestock should not be allowed on or near the LAA; if such animals are kept, the land application area should be fenced off to prevent system damage and/or soil compaction.
- Do not allow vehicles on or near the LAA.
- If present, keep the surface and/or sub-surface cut-off drain above or adjacent to the LAA open and clear of debris to prevent rainwater flowing into the disposal area.
- Pipe overflow from rainwater tank(s) away from LAA.

Problems may occur with systems which have not been properly maintained and where absorption areas have become blocked or clogged. The warning signs are obvious and include:

- LAA is wet or soggy with wastewater ponding on the surface of the ground.
- "Sewage" smells near septic tank (if present).





## Attachment 6

(2 pages)

### Risk Assessment

#### Primary wastewater treatment followed by discharge to a nonconventional (raised) bed

Tables 6.1 and 6.2 summarise a risk management approach for the wastewater management system at this site, in general accordance with Clause A3.2 of AS/NZS1547:2012.

Table 6.1 Terminology used in risk management in this report

Table 6.2 Issues relating to the use and sustainable management of the wastewater system at this site

Table 6.1 contains subjective descriptions of likelihood and consequence. Table 6.2 is a risk assessment of the system components.

Table 6.1. Terminology used in risk management in this report

Likelihood	Consequences to property and or indicated stakeholders			
	Major	Medium	Minor	Insignificant
Almost certain	VH	VH	H	L
Likely	VH	H	M	L
Possible	H	M	L	VL
Unlikely	M	L	L	VL
Rare	L	L	VL	VL
Barely credible	VL	VL	VL	VL

**Notes**

1. An **issue** is a physical, chemical or environmental aspect of a particular site (as listed in Trench3) which should usually (but not necessarily always) be considered in the design of a wastewater system at the site.
2. **Likelihood** describes the possibility – if untreated – of the issue causing a hazard over the projected operational life of the on-site wastewater management system
3. A **hazard** is a physical, chemical or biological agent with the potential to cause harm.
4. **Consequence** describes the level of impact or harm caused by a hazard:  
Insignificant = harm easily remedied by landowner or licenced plumber; all wastewater retained on land application area  
Minor = harm requires licenced plumber to remedy; all wastewater retained on land application area  
Medium = harm requires licenced plumber to remedy; some or all wastewater discharges via surface or shallow seepage off the land application area but all is retained on the property  
Major = harm requires licenced plumber to remedy; some or all wastewater discharges via surface or shallow seepage off the land application area and property to one or more neighbours and/or receiving waters. Regulator serves notice to landowner.
5. **Risk** = Likelihood combined with Consequence. VL = Very Low; L = Low; M = Moderate; H = High; VH = Very High. Levels are colour-coded.

6. **Stakeholders** (Section A3.2.1 of AS/NZS1547:2012)  
(the risk assessment applies to the stakeholders indicated below)

Internal stakeholders

- client (property owner)
- property occupier (if not owner)
- site investigator
- system designer
- system installer
- equipment supplier
- servicing agent

External stakeholders

- regulator
- neighbouring property owners

7. The definitions of issue, likelihood, consequence and risk shown here are proposed by William C Cromer Pty Ltd, but do not have the approval of any regulatory authority. Comment and feedback are welcomed from wastewater practitioners.





Table 6.2 Issues relating to the use and sustainable management of the wastewater system.  
Source: The Director of Building Control *Accreditation and Maintenance of Plumbing Installations* (November 2017)

Issue #	System component	Size, etc	Confidence level of value used	Potential hazard(s) related to use	Before treatment			After treatment		
					Likelihood of this issue causing a hazard	Consequences to property and stakeholders if issue causes a hazard	Level of risk to property and stakeholders if issue creates a hazard	Likelihood of this issue becoming a hazard	Consequences to property and stakeholders if issue causes a hazard	Level of risk to property and stakeholders if issue becomes a hazard
1	AWTS	To be determined	High	Malfunction of any component	Possible	Medium	Moderate	Possible	Minor	Low
2	Buried pipework from AWTS to nonconventional bed: clogging of pipework	32mm colour-coded HDPE (poly)	High	Breakage	Possible	Medium	Moderate	Possible	Minor	Low
3	Nonconventional bed (LAA)	Min. 160m <sup>2</sup> footprint with min. wetted area of 75m <sup>2</sup>	High	Clogging of pipework	Possible	Medium	Moderate	Possible	Minor	Low





## Attachment 7

(3 pages)

### Form 35 for this project

<b>CERTIFICATE OF THE RESPONSIBLE DESIGNER</b>	Section 94 Section 106 Section 129 Section 155																						
<b>Form 35</b>																							
To: <input type="text" value="S. OWEN"/> Owner name <input type="text" value="230 Apollo Bay Road"/> Address <input type="text" value="Apollo Bay, Bruny Island"/> <input type="text"/> Suburb/postcode																							
<b>Designer details:</b>																							
Name:	<input type="text" value="Bill Cromer"/> Category: <input type="text"/>																						
Business name:	<input type="text" value="William C Cromer Pty Ltd"/> Phone No: <input type="text" value="0408 122 127"/>																						
Business address:	<input type="text" value="74A Channel Highway"/> <input type="text" value="Taroona"/> <input type="text" value="7053"/> Fax No: <input type="text"/>																						
Licence No:	<input type="text" value="CC6184Q"/> Email address: <input type="text" value="billcromer@bigpond.com"/>																						
<b>Details of the proposed work:</b>																							
Owner/Applicant	<input type="text" value="S. OWEN"/> Designer's project reference No. <input type="text"/>																						
Address:	<input type="text" value="230 Apollo Bay Road"/> <input type="text" value="Apollo Bay, Bruny Island"/> <input type="text"/>																						
Type of work:	Building work <input type="checkbox"/> Plumbing work <input checked="" type="checkbox"/> (X all applicable)																						
Description of work:	<input type="text" value="On-site wastewater management system"/> <div style="font-size: small; margin-left: 20px;">                 (new building / alteration / addition / repair / removal / re-erection / water / sewerage / stormwater / on-site wastewater management system / backflow prevention / other)             </div>																						
<b>Description of the Design Work (Scope, limitations or exclusions):</b> (X all applicable certificates)																							
Certificate Type:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Certificate</th> <th style="width: 70%;">Responsible Practitioner</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> Building design</td> <td>Architect or Building Designer</td> </tr> <tr> <td><input type="checkbox"/> Structural design</td> <td>Engineer or Civil Designer</td> </tr> <tr> <td><input type="checkbox"/> Fire Safety design</td> <td>Fire Engineer</td> </tr> <tr> <td><input type="checkbox"/> Civil design</td> <td>Civil Engineer or Civil Designer</td> </tr> <tr> <td><input type="checkbox"/> Hydraulic design</td> <td>Building Services Designer</td> </tr> <tr> <td><input type="checkbox"/> Fire service design</td> <td>Building Services Designer</td> </tr> <tr> <td><input type="checkbox"/> Electrical design</td> <td>Building Services Designer</td> </tr> <tr> <td><input type="checkbox"/> Mechanical design</td> <td>Building Service Designer</td> </tr> <tr> <td><input checked="" type="checkbox"/> Plumbing design</td> <td>Plumber-Certifier, Architect, Building Designer or Engineer</td> </tr> <tr> <td><input type="checkbox"/> Other (specify)</td> <td></td> </tr> </tbody> </table>	Certificate	Responsible Practitioner	<input type="checkbox"/> Building design	Architect or Building Designer	<input type="checkbox"/> Structural design	Engineer or Civil Designer	<input type="checkbox"/> Fire Safety design	Fire Engineer	<input type="checkbox"/> Civil design	Civil Engineer or Civil Designer	<input type="checkbox"/> Hydraulic design	Building Services Designer	<input type="checkbox"/> Fire service design	Building Services Designer	<input type="checkbox"/> Electrical design	Building Services Designer	<input type="checkbox"/> Mechanical design	Building Service Designer	<input checked="" type="checkbox"/> Plumbing design	Plumber-Certifier, Architect, Building Designer or Engineer	<input type="checkbox"/> Other (specify)	
Certificate	Responsible Practitioner																						
<input type="checkbox"/> Building design	Architect or Building Designer																						
<input type="checkbox"/> Structural design	Engineer or Civil Designer																						
<input type="checkbox"/> Fire Safety design	Fire Engineer																						
<input type="checkbox"/> Civil design	Civil Engineer or Civil Designer																						
<input type="checkbox"/> Hydraulic design	Building Services Designer																						
<input type="checkbox"/> Fire service design	Building Services Designer																						
<input type="checkbox"/> Electrical design	Building Services Designer																						
<input type="checkbox"/> Mechanical design	Building Service Designer																						
<input checked="" type="checkbox"/> Plumbing design	Plumber-Certifier, Architect, Building Designer or Engineer																						
<input type="checkbox"/> Other (specify)																							
Deemed-to-Satisfy: <input checked="" type="checkbox"/>	Performance Solution: <input type="checkbox"/> (X the appropriate box)																						
Other details:  See Cromer (2025) report below																							





**Design documents provided:**

The following documents are provided with this Certificate –

*Document description:*

Drawing numbers: See Cromer (2025) report below	Prepared by:	Date:
Schedules: See Cromer (2025) report below	Prepared by:	Date:
Specifications: See Cromer (2025) report below	Prepared by:	Date:
Computations: See Cromer (2025) report below	Prepared by:	Date:
Performance solution proposals: See Cromer (2025) report below	Prepared by:	Date:
Test reports: See Cromer (2025) report below	Prepared by:	Date:

**Standards, codes or guidelines (where applicable) relied on in design process:**

AS/NZS1547:2012 On-site domestic wastewater management  
Cromer, W. C. (1999). Trench™3.0: A computer application for site assessment and system sizing, in Patterson, R. A. (Ed.) *On-site '99 – Proceedings of the On-Site '99 Conference: Making on-site wastewater systems work*. Univ. of New England, Armidale, 13-15 Jul 1999, pp 85-88

E23.0 Tasmanian *On-site Wastewater Management Code*

The Tasmanian Director of Building Control's *Guidance for On-site Wastewater Management Systems* (Nov 2017)

The Tasmanian Director of Building Control's *Determination – Accreditation and Maintenance of Plumbing Installations* (Dec 2016)

**Any other relevant documentation:**

Cromer, W. C. (2025). *Site and Soil Evaluation Report, and System Design for On-site Wastewater Management, new house at 230 Apollo Bay Road, Bruny Island*. Unpublished report for S. Owen by William C. Cromer Pty. Ltd., 10 September 2025.

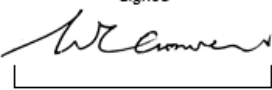
**Attribution as designer:**

I William C Cromer.....

am responsible for the design of that part of the work as described in this certificate;

The documentation relating to the design includes sufficient information for the assessment of the work in accordance with the *Building Act 2016* and sufficient detail for the builder or plumber to carry out the work in accordance with the documents and the Act;

This certificate confirms compliance of the report and is evidence of suitability of this design with the requirements of the National Construction Code.

	<i>Name: (print)</i>	<i>Signed</i>	<i>Date</i>
Designer:	William C Cromer		10 September 2025
Licence No:	CC6184Q		





**Assessment of Certifiable Works: (TasWater)**

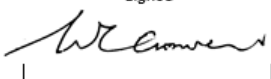
**Note: single residential dwellings and outbuildings on a lot with an existing sewer connection are not considered to increase demand and are not certifiable.**  
**If you cannot check ALL of these boxes, LEAVE THIS SECTION BLANK.**  
**TasWater must then be contacted to determine if the proposed works are Certifiable Works.**

I confirm that the proposed works are not Certifiable Works, in accordance with the Guidelines for TasWater CCW Assessments, by virtue that all of the following are satisfied:

- The works will not increase the demand for water supplied by TasWater
- The works will not increase or decrease the amount of sewage or toxins that is to be removed by, or discharged into, TasWater's sewerage infrastructure
- The works will not require a new connection, or a modification to an existing connection, to be made to TasWater's infrastructure
- The works will not damage or interfere with TasWater's works
- The works will not adversely affect TasWater's operations
- The work are not within 2m of TasWater's infrastructure and are outside any TasWater easement
- I have checked the LISTMap to confirm the location of TasWater infrastructure
- If the property is connected to TasWater's water system, a water meter is in place, or has been applied for to TasWater.

**Certification:**

I .....William C Cromer..... being responsible for the proposed work, am satisfied that the works described above are not Certifiable Works, as defined within the *Water and Sewerage Industry Act 2008*, that I have answered the above questions with all due diligence and have read and understood the Guidelines for TasWater CCW Assessments.  
Note: the Guidelines for TasWater Certification of Certifiable Works Assessments are available at: [www.taswater.com.au](http://www.taswater.com.au)

	<i>Name: (print)</i>	<i>Signed</i>	<i>Date</i>
Designer:	William C Cromer		10 September 2025





## Attachment 8

(2 pages)

### **Documents required when applying for a plumbing permit for an on-site wastewater management system**

Source: Director of Building Control Director's Specified List (Part 3), September 2017 v1.2  
Stakeholders should check online that this is the latest version.

The documents listed below are required to accompany an application for a plumbing permit for the installation of an on-site wastewater management system.

1. Complete drawings of the installation, drawn to a scale of not less than 1:200 or as agreed to by the Permit Authority, showing the following:

- (a) the title boundaries of the land;
- (b) the position of any existing or proposed buildings on the land and their use;
- (c) the position of any roads or driveways on the land;
- (d) the location of any water courses;
- (e) the contours on the land;
- (f) the position of the Wastewater treatment unit; Wastewater land application area (absorption trenches, mound, irrigation area); Pump chamber, distribution box or other manual or automatic valve; Soil evaluation test holes.
- (g) the location and size of any drains and vents;
- (h) the location of any cut-off drains diverting surface water or sub-soil drains for ground water;
- (i) the location of the outlets from the building;
- (j) A cross section drawing demonstrating that there is sufficient gravity fall from the plumbing fixtures to the wastewater treatment unit and land application area.
- (k) Operation and maintenance guidelines for the OWMS
- (l) Installation instructions for the wastewater treatment unit and land application area

2. Written details of the proposed fixture unit load on the system or parts of the system.

3. A site-and-soil evaluation report completed in accordance with AS/NZS 1547:2012 clause 5.2

4. A Design report which is consistent with the Director of Building Control Onsite Wastewater Management Guidelines and includes the following;

- (a) A design based on the site and soil evaluation report
- (b) Design calculations for the wastewater land application system and wastewater treatment unit
- (c) Specification for the wastewater treatment unit, if a unique on-site wastewater management system a design report from a suitably qualified designer demonstrating compliance with the performance requirements of the Volume 3 of the NCC.
- (d) A loading certificate setting out the design criteria and the limitations associated with use of the system incorporating the following:
  - System capacity (number of persons and daily flow)
  - Summary of design criteria





- The location of and use of the reserve area
- Use of water efficient fittings, fixtures, or appliances
- Allowable variation from design flows (peak loading events)
- Consequences of changes in loading (due to varying wastewater characteristics)
- Consequences of overloading the system
- Consequences of underloading the system
- Consequences of lack of operation, maintenance, and monitoring attention
- Any other relevant considerations related to use of the system; and

(e) The results of the risk management process undertaken in accordance with AS/NZS 1547 Clause A3.2. if required by the Director of Building Control Onsite Wastewater Management Guidelines.

5. A written specification and construction details of the land application system to be used, including details of the following:

- (a) the type of system;
- (b) the trade name, if any;
- (c) the manufacturer's name and address;
- (d) the design capacity of the system; and
- (e) a section (drawing detail) through the land application system, of not less than 1:20, specifying its construction.
- (f) Pump chamber capacity, pump and supply pipe specifications (where appropriate)
- (g) Distribution boxes, automatic sequencing valves, dosing syphons or other pulse dosing devices.

6. Copy of Certificate of Accreditation issued under the Building Act by the Director of Building Control for the on-site wastewater management system (if applicable).

7. Any other document or certificate required by the relevant permit authority or environmental health officer

